IITB-Monash Research Academy

Indian Institute of Technology Bombay | MONASH University

An Indian-Australian research partnership

Project Title:	**NanoBiofuel cell Based on Nanoporous Carbon**
Project Number	**IMURA0216**
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Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?
(*Feel free to nominate more than one. For more information, see www.iitbmonash.org)*

1. Advanced computational engineering, simulation and manufacture
2. Infrastructure Engineering
3. **Clean Energy**
4. Water
5. **Nanotechnology**
6. Biotechnology and Stem Cell Research

The Research Problem

Next-generation energy-harvesting systems will need to be produced from renewable sources as well as work in a sustainable manner. Advancement in nanotechnology and biotechnology may lead to such systems at low cost with minimum environmental concerns. For example, batteries are devices that chemically store and release electrical energy. Traditional electrode materials rely on harsh reactions of precious metals or oxide to produce electricity, which is not an environmental friendly process. The use of biomaterials or bio-derived materials can potentially overcome the challenges. In particular, biofuel cells may someday lead to true sustainable energy devices.

Project aims

We aim to fabricate nanobiofuel cell out of nanocarbon produced from renewable resources.

(1) Nanocarbon will be produced from renewable resources;
(2) As-produced nanocarbon will be fabricated as high-surface-area electrode;
(3) Chemically treat nanocarbon to make it biofriendly interface;
(4) Attach redox enzymes onto nanocarbon electrode surfaces;
(5) Investigate enzymatic electrochemical properties;
(6) Assemble prototype nanobiofuel cells;
(7) Test performance of invented nanobiofuel cells.

Expected Outcomes

(1) Joint publications;
(2) Lead to joint grant such as Australia-India funding scheme.

How will the project address the Goals of the above Themes?

The proposed project is closely related to nanotechnology, especially, synthesis and processing of nanomaterials;
The proposed project address biomolecules which is environmentally friendly compared to noble metal catalysts used in many fuel cell systems.